Access to health insurance and utilization of public sector substance use treatment: Evidence from the Affordable Care Act dependent coverage provision

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Abstract

The relationship between insurance coverage and use of substance use disorders (SUDs) treatment is not well understood. SUD treatment has long been segregated from general medical care, and has had low reliance on private insurance. We examine changes in admissions to publicly-funded, specialty SUD treatment following the implementation of a 2010 Affordable Care Act provision requiring health insurers to offer dependent coverage to young adult children. We compare admissions from the 2007-2012 Treatment Episode Data Set among targeted young adults to older adults. We find that admissions to treatment declined by 11 percent among young adults after the provision. However, the share of young adults covered by private insurance increased by 9.3 percentage points and the share with private insurance as the payment source increased by 6.5 percentage points. This increase was largely offset by decreased self-payment and payment by state and local government sources, followed by decreased Medicaid payment. Public sector providers gained new revenues from private insurers, and the share of patients paying primarily out-of-pocket decreased. Our findings suggest expansions of private insurance may not increase demand for public sector treatment but could provide important revenue for existing patients.

Key words: Dependent care coverage; Affordable Care Act; health insurance; substance use disorder treatment

JEL Codes: I13, I11, I18

I. Introduction

The effect of health insurance on health care utilization is a topic of fundamental interest in health economics and is central to evaluating the effects of the Patient Protection and Affordable Care Act (ACA). Beginning in September 2010, the ACA required private health insurers to offer dependent coverage to young adult children under age 26 of their enrollees. [1] This provision generated a novel quasi-experiment to study the effects of private health insurance on use of health care among young adults. Prior to enactment of the dependent coverage provision, federal law only required private insurers to offer coverage to all dependent children under age 19 and to fulltime students under 23 years (Goldman 2013). Although 37 states had some prior law that required dependent coverage for young adults, these laws were generally less comprehensive than the 2010 provision and evidence is mixed on the extent to which they increased young adult insurance coverage (Levine, McKnight, and Heep 2011; Monheit et al. 2011). By comparison, a series of studies suggest that the ACA dependent coverage provision expanded insurance coverage to over two million young adults (Akosa Antwi, Moriya, and Simon 2013; Sommers et al. 2013; Sommers and Kronick 2012).

In this study, we focus on the impact of the young adult provision on specialty treatment of substance use disorders (SUDs). Specialty SUD treatment is defined as treatment for an SUD at a drug or alcohol rehabilitation center or mental health center. SUDs have an elevated prevalence in young adulthood, are associated with large social expenditures, and have historically had limited payment from private insurance for treatment services. Our detailed examination of specialty SUD treatment adds to a growing literature on the health care access

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[1] Before 2014 some grandfathered private health insurance plans (i.e. those that existed before the ACA and had not substantially changed their benefits) were not required to offer coverage if the adult dependent had a private health insurance offer through their employer. (United States Department of Labor N.D.)

effects of the dependent coverage provision (Akosa Antwi, Moriya, and Simon, 2015; Barbaresco, Courtemanche, and Qi, 2014; Mulcahy et al., 2013).

Relatively little is known about the impact of the ACA provision on SUD treatment specifically. Two studies, described in Section 2, have considered changes in SUD admissions to psychiatric hospitals (Golberstein et al. 2014) and use of SUD treatment within a relatively small national survey sample (Saloner and Cook 2014). Ours is the first study to use a large national database of SUD treatment admissions. Our data source is the Treatment Episode Data Set (TEDS), which annually covers more than 2 million admissions to specialty SUD treatment facilities that receive funding from public sources. We consider three outcomes: changes in number of admissions, insurance status of young adults admitted to treatment, and expected source of payment for treatment (measured separately from insurance status). We explore these results overall, for several subgroups of policy interest, and across treatment modality. Unique information in the TEDS allows us to examine not only whether the provision changed whether young adults seek treatment, but also the degree to which treatment providers were able to gain a relative increase in reimbursements from private insurance. This distinction is particularly important for SUD treatment, as specialty SUD treatment is heavily financed by public payers and has been historically characterized by a relatively low degree of private health insurance payment (Wisdom, Ford, and McCarty 2010).

We find that compared to adults age 30-34, admissions for SUDs decreased by about 11 percent for adults age 21-24. The decrease applied to both young adult men and women. We also find a decrease in admissions for white young adults (11 percent) that is consistent across various specifications and samples. The effect of the provision on other racial groups is sensitive to sample specification, with some evidence of an increase in admissions for Hispanic young

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adults. Our analysis of admissions by type of substance shows that treatment for alcohol and illicit drugs decreased after the passage of the law by 17 and 9 percent, respectively. The law had a heterogeneous impact on the setting of treatment. Admissions at outpatient facilities that provide intensive treatment and those to residential settings did not change after the dependent coverage provision. Our main result is driven by a statistically significant 27 percent decrease in admissions at non-intensive outpatient facilities, a treatment setting that is potentially substitutable for care paid for by private insurance and received outside the public sector (including treatment in doctor's offices).

Among those who receive their care in the publicly funded facilities in our sample, we find substantial effects on coverage and payer source. Overall, the share of adults age 21-24 in treatment with private insurance increased by 9.3 percentage points compared to adults age 30-34, a relative increase of 85.8 percent over the baseline. This increase in private insurance admissions was primarily offset by declines in the share of adults in treatment age 21-24 that had Medicaid and the share that was uninsured. Private insurance as a source of payment for treatment (measured separately from coverage status) increased by 6.5 percentage points relative to adults 30-34, representing a relative increase of 103.0 percent over the baseline. Increased private payment was largely offset by decreased self-payment followed by payment from state and local payments. The increases in private coverage and payment were largest for whites, males, and those admitted to residential and intensive outpatient facilities.

The rest of this paper is organized as follows: in the next section we provide theory and evidence on the effect of insurance expansions on utilization of SUD treatment. We describe our data sources in section III. In section IV, we outline our econometric specification. We present

our results in section V and evaluate the validity of our study design in section VI. Sections VII contain our discussion and conclusions.

II. Theory and Evidence on the Effect of Insurance Expansions on Utilization of SUD Treatment

The effects of expanded access to SUD treatment on young adults warrant careful exploration not only because SUDs are costly chronic illnesses with large social externalities, but also because the financing and delivery of SUD treatment has historically been limited in scope. SUDs have an elevated prevalence in young adulthood and often have effects that persist into later life (Kessler et al. 1994). Thus, policies that reduce the cost of SUD treatment and increase choice for younger adults with SUDs could yield substantial societal and individual benefits well into the future.

The costs of SUDs are wide-ranging, and extend well beyond addiction treatment costs. SUDs are associated with morbidity and mortality (Carpenter and Dobkin 2009; Mokdad et al. 2004), higher rates of suicide attempts (Borges, Walters, and Kessler 2000; Kessler, Borges, and Walters 1999; Dhossche, Ulusarac, and Syed 2001), increased utilization of general health care (Balsa et al. 2009; French, Fang, and Balsa 2011), traffic fatalities (Adams, Blackburn, and Cotti 2011), crime and violence (Markowitz 2005; Carpenter 2007), and reduced productivity in the labor market (Mullahy and Sindelar 1996; French, Roebuck, and Alexandre 2001). Importantly, SUD treatment has been shown to cost-effectively reduce SUDs and minimize associated social costs (Rajkumar and French 1997; Gossop et al. 2002; Reuter and Pollack 2006).

Despite these benefits, SUD treatment is underutilized among individuals who could potentially benefit from treatment and is particularly underutilized among young adults (SAMHSA 2014a). Only one in ten adults with a diagnosable SUD receive such treatment in any given year (SAMHSA 2014a).

II.A. Experiences from Prior Insurance Expansions

Basic economic theory suggests that expanded eligibility for health insurance should increase demand for treatment by lowering the price of care, but empirical estimates of how much demand changes vary widely across treatments (Abraham 2014). Demand for mental health and SUD treatment is especially price elastic (Frank and McGuire 2000), and pent-up demand for SUD treatment may be particularly strong since individuals with SUDs are substantially more likely than those without SUDs to lack health insurance (Beronio et al. 2013). Moreover, financial barriers are the most common reason for not receiving treatment among those individuals with SUDs who said that they have sought, but did not receive, treatment in the prior year (SAMHSA 2014b).

There is limited evidence on the effects of insurance expansions on SUD treatment, and effects vary across populations and treatment settings examined. A recent study by Meara and colleagues (2014) examined changes in inpatient hospital care among young adults after the 2006 health reform law in Massachusetts. They found significant and substantively large declines in emergency department (ED) use and inpatient hospitalizations related to SUD disorders, which could be attributable to broadened access to outpatient SUD treatment.

State parity laws mandating that private health insurance plans cover behavioral health (i.e., SUD and mental health) services at parity with general health care services provide another natural experiment to study the impact of insurance expansions on SUD treatment utilization,

since these laws are intended to reduce the cost and barriers to accessing SUD treatment. While some studies focusing on parity in single states or within the Federal Employees Health Benefits program have found that parity laws had limited impacts on SUD treatment (Azzone et al. 2011; McConnell, Ridgely, and McCarty 2012), other studies, such as Dave and Mukerjee (2011), documented that parity laws not only increased the number of admissions to SUD treatment but also the fraction of clients admitted with private health insurance. Similarly, using facility-level data aggregated by state, Wen and colleagues (2013) found that state parity laws increased the number of admissions to SUD treatment by 9 percent, and the effect was even larger when considering facilities that accept private insurance.

Within the growing literature on the ACA dependent coverage provision, few studies have examined behavioral health treatment. Some studies examine mental health and substance use disorder treatment without disaggregating by disorder. Akosa Antwi, Moriya, and Simon (2015) find that the provision increased hospitalizations for psychiatric diagnoses (including SUDs) among young adults. Fronstin (2013) examined data from a large employer and finds that young adults covered by the dependent coverage provision were disproportionately likely to use behavioral health services.

Additionally, two recent studies have attempted to disentangle the effect of the dependent coverage provision on use of SUD treatment independent of mental health treatment. Golberstein et al. (2014) find that the provision was associated with a modest increase in psychiatric admissions to general hospitals, with admissions for SUDs accounting for the largest increase. Using the National Survey of Drug Use and Health (NHDUH), Saloner and Cook (2014) find that the provision increased use of mental health treatment by 17 percent among young adults relative to a comparison sample of older adults, it had no discernible effect on SUD

treatment use. Saloner and Cook also find no significant differences in the percentage of individuals receiving SUD treatment that were paid for with private insurance.

The inconsistent effects of coverage expansions on use of SUD treatment may stem, in part, from other demand-side constraints. First, while expansions of private insurance can substantially reduce total out-of-pocket cost of SUD treatment, they do not necessarily eliminate copayments or other forms of cost-sharing at the point of service. Such cost-sharing mechanisms may discourage utilization among the newly insured. Second, financial barriers notwithstanding, there are non-economic factors such as stigma that may affect willingness to seek SUD treatment (Keyes et al. 2010). These factors may be larger among underserved or disadvantaged populations, including racial/ethnic minorities. Finally, the demand-side response of the uninsured to new insurance coverage will depend on the availability and quality of reduced price (or free) care in the community, as safety net care may partially substitute for care covered by private coverage (Lo Sasso and Meyer, 2006). If individuals do not need insurance to get access to the desired quality of SUD treatment, then treatment demand will respond only weakly to insurance coverage. However, private insurance could increase individuals' options outside of the public sector, which could lead to some substitution to providers that only accept private payments (e.g., obtaining care in a private doctor's office).

II.B. System Capacity and Other Constraints

The capacity of different providers to absorb new patient populations is another factor that may affect changes in use of treatment after insurance expansions. In the public sector, where the majority of individuals receive SUD treatment, treatment options are limited and waiting periods to enter treatment exist in some areas (Carr et al. 2008). Limited capacity was

cited as one potential constraint on expanded access to SUD treatment after the 2006

Massachusetts insurance reform (Capoccia et al. 2012).

SUD treatment has historically been underfunded and segregated from general health

care. More than half of the public funding for SUD treatment has come directly from state and

local funding grants, supported in part by block grant funding from the federal government

(SAMHSA 2013). In contrast to mental health treatment, which is disproportionately paid for

with federal Medicaid funds, SUD treatment providers have long existed outside of the realm of

any health insurance – private or public. Buck (2011) notes that on the eve of ACA

implementation, modern billing and encounter systems necessary for receiving payment from

Medicaid and private insurance were lacking in many SUD treatment facilities – one fifth of all

facilities lacked any kind of electronic information system. This lack of billing capacity may be

one of several factors preventing providers from improving access to, and duration of, treatment

(Guerrero et al. 2014).

Because private insurance payment has historically played a limited role in SUD

treatment, public sector providers may change their mix or quality of services in response to

increased availability of private insurance. This change could occur by increasing the

comprehensiveness of services or by providing more wraparound services to consumers. Newly

insured individuals may also take advantage of greater private payment by "upgrading," using

their private coverage to gain access to settings that may be more restricted to the uninsured such

as residential care or intensive outpatient treatment (as compared to non-intensive outpatient).

However, for these changes to take place, providers need to be able to respond by extracting

private insurance payment from newly privately insured patients.

II.C. *Hypotheses*

Theory and evidence from prior private insurance expansions suggest that access to insurance coverage is likely to increase the number of individuals seeking treatment, and that individuals in treatment will more likely be covered by private insurance and have private insurance pay for their treatment. However, these effects may differ across subgroups. The effects are hypothesized to be largest among groups that were most likely to gain insurance coverage, for those who might like to receive treatment but experience financial barriers, and those for whom private insurance coverage is likely to provide access to high quality care not otherwise available when uninsured. Relatedly, the supply side response to the dependent coverage provision could be shaped by the ability of providers to capture additional revenues from the privately insured, and to invest those revenues into new slots in treatment.

It is also important to note that our data set includes only one form of SUD treatment: specialty treatment received in public sector facilities. Although we expect access to private health insurance through the dependent coverage provision to increase demand for health care overall among the newly insured, we do not have a clear prediction on the types or settings of care for which demand will increase. It is possible that, while demand overall will increase, demand for specific types of services (such as publicly funded treatments) will decline.

III. Data Sources, Study Outcomes, and Sub-groups

III.A. Data Sources

We analyzed data from four sources spanning the years 2007 to 2012: the Treatment Episode Data Set (TEDS) files, the Bureau of Labor and Statistics Local Area Unemployment Database state-level annual unemployment rates, the annual U.S. Census Bureau state population by age, and state-level demographic variables (sex, age, race/ethnicity, marital status, education,

rural status) from the Annual Social and Economic Supplement to the Current Population Survey (ASEC). TEDS is an administrative database compiled by the federal Substance Abuse and Mental Health Services Administration (SAMHSA) in cooperation with state agencies. TEDS includes information on approximately two million annual admissions to substance abuse treatment. These are predominantly facilities that receive at least some public funding to support the provision of SUD treatment. The data includes most admissions to specialty SUD treatment facilities in the U.S., but does not generally include treatment received in correctional facilities, facilities operated by the Department of Defense, and facilities that do not receive any federal funding. Moreover, the data set does not include forms of non-specialty care such as treatment received in private doctor's office. This database has been used to study state and national trends in SUD treatment (Anderson 2010; Dave and Mukerjee 2011; Jena and Goldman 2011; Pacula et al. 2013). Although the TEDS sample is not nationally representative of all individuals using substance abuse treatment, the demographics (race/ethnicity and age category) of individuals in the TEDS are comparable to samples of individuals who report having received SUD treatment from the National Survey of Drug Use and Health (Gfroerer et al. 2014), a nationally representative population sample. A study of 1997 TEDS data estimated that the survey covered 67 percent of all admissions to SUD treatment in the U.S. (ASPE N.D.). Collectively, these statistics suggest that the TEDS captures a large segment of treatment admissions of high relevance for SUD treatment policy.

We defined our population of young adults and the comparison sample of older adults using the age categories available in the TEDS (age is not reported in exact years).[2] The ACA provision applies to persons age 19-26, but using the categories available in the TEDS, we

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[2] The age categories provided in TEDS are as follows: 12-14, 15-17, 18-20, 21-24, 25-29 , 30-34, 35-39, 40-44, 45-49, 50-54 , 55 and over.

defined the treated young adult group as individuals age 21-24 and defined our preferred

comparison group as individuals age 30-34. We defined this group as the preferred comparison

group because the adjacent age group, age 25-29, includes 25 and 26 year olds who were also

affected by the provision, which would make comparisons problematic.

Combining all years, we began with a sample of 1,386,564 admissions from 21-24 year

olds and 1,384,071 admissions from 30-34 year olds. We applied several sample exclusions for

our main analyses of utilization and health insurance trends (shown in Table 1).   First, in

defining our analysis sample, we excluded admissions where the referral source was listed as the

criminal justice system. Admissions from the criminal justice system are likely to be coerced,

rather than voluntary, and would therefore be less responsive to private health insurance

expansions (Dave and Mukerjee 2011). Second, consistent with other prior studies of substance

treatment using the TEDS (Saloner and Cook 2013), we excluded admissions that were for

detoxification only since detoxification is generally considered a precursor to addiction

treatment, rather than treatment itself. Third, we restricted the sample to individuals receiving

treatment in the 25 states[3] where health insurance status is reported in the TEDS for 85 percent

or more of all observations in each year between 2007 and 2012. Health insurance is not a core

variable in the TEDS, that is, only a sub-set of states voluntarily provide this information to

SAMHSA. Fourth, for our analyses on payer source, we restricted the sample to the 18 states[4]

that additionally contain information on payer source.[5] The final sample sizes are as follows:

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[3] These states are AR, CO, DE, HI, IL, KS, KY, LA, ME, MD, MA, MO, MT, NE, NV, NH, NJ, ND, OR, PA, SC, SD, TX, UT, WY.
[4] These states are AR, CO, DE, HI, KS, KY, LA, MO, MT, NV, NH, NJ, ND, PA, SC, SD, TX, UT.
[5] In the TEDS health insurance status is documented with the following item: "Specifies the client's health insurance (if any). The insurance may or may not cover alcohol or drug treatment." Payer source is documented with the following item: "Identifies the primary source of payment for this treatment episode. Guidelines: States operating under a split payment fee arrangement between multiple payment sources are to default to the payment source with the largest percentage. When payment percentages are equal, the State can select either source."

182,511 younger adults and 195,228 older adults for the admissions and health insurance coverage analyses; and 110,857 young adults and 119,501 older adults for the payer source analyses.

For our main extensive margin (admissions) analysis, which is independent of insurance or payment status, we perform sensitivity analysis with a sample that excludes admissions for detoxification and referrals from the criminal justice system only. This sample has information on all 50 states and the District of Columbia (1,013,838 observations). We note (and discuss in detail in Section 6) that our main results are not qualitatively different when we use this comprehensive sample.

III.B. Study Outcomes

We examined the impact of the ACA dependent coverage provision on three primary outcomes: (1) total number of admissions to treatment among young adults; (2) insurance status of young adults using treatment; and (3) expected primary payer source of young adults using treatment. Insurance status is distinguished from payer source since an individual's insurer does not always pay for SUD treatment and private health insurance penetration has been historically low in this sector. Our estimates of total admissions are expressed as a rate: the number of admissions to treatment per 1,000 individuals in that age group, by state. The population denominators by sex and race/ethnicity are specific to those groups. For our analysis of insurance status we focused on health insurance status at the individual level defined in terms of four categories: private health insurance, Medicaid, other health insurance (including military coverage and Medicare, which covers some adults with disabilities), and no insurance. For our analysis of payer source we focused on four types of primary payment that an individual could utilize for SUD treatment: private health insurance, Medicaid, other public programs and payers

(including state and local programs), and self-pay (where the individual is expected to pay out-of-pocket for care). Although it is possible that a facility can receive more than one type of payment for a treatment episode, the TEDS defines the primary payer as whichever entity supports more than 50 percent of the cost of the treatment episode.

III.C. Subgroups

We examined differences across sex and separately for the three largest racial/ethnic groups (non-Hispanic whites, non-Hispanic African Americans, and Hispanics) since access to SUD treatment is known to vary across these groups (Cook and Alegria 2011; Cummings et al. 2014; Mulvaney-Day et al. 2012), and because of the disproportionately limited treatment options for minorities mentioned above (Guerrero 2010; Saloner and Cook 2013). We also examined differences by type of facility where treatment was being utilized: residential facilities (short-stay and long-stay facilities, as well as non-detox hospitals), intensive outpatient (where the individual would receive outpatient treatment lasting two or more hours per day for three or more days per week), and non-intensive outpatient (treatment taking place fewer than three days per week or for less than two hours per session). Outpatient services are defined as ambulatory treatment services including individual, family, and/or group services, and may include pharmacological therapies. We examined differences across the treatment settings to assess potential effects on treatment upgrading since it may be more difficult for the uninsured to access intensive and residential treatment and to assess differences in acceptance of insurance payment by facility type. We also considered the impact of the provision separately for alcohol and for all

other drugs,[6] as there may be differences across legality of substance use or by populations using alcohol and other drugs.

IV. Empirical Specification

We used differences-in-differences (DID) models to compare changes in the number of admissions, insurance status, and payment source between young adults using publicly-funded substance abuse treatment and older adults. These models identify the average effect of the dependent coverage provision as any changes in the study outcomes within the targeted population of young adults age 21-24 after the provision relative to changes in the same outcomes within a comparison group of older adults age 30-34 years.

The validity of the DID approach requires that the trends in the treatment and control group would be the same in the absence of the provision, i.e. that there were no other factors concurrent with the implementation of the ACA provision that disproportionately impacted SUD treatment utilization or insurance coverage of young adults relative to older adults. This assumption is most plausible if younger and older adults were both equally affected by time-varying factors such as changes in the market for health insurance or in the prevalence of SUDs, but only the younger adults were affected by the 2010 provision.

We estimated least squares regression models for all of our outcomes. In our preferred specification we excluded the year 2010 to minimize potential bias from the policy

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[6] We defined drug versus alcohol treatment using the variable identified as "primary substance targeted for treatment" (thus an individual could be admitted primarily for alcohol treatment but also be identified as a user of illicit drugs, and vice versa).

implementation period, since dependent coverage was not required of private health insurers

until September of that year but was partially implemented by some insurers earlier that year.

For our DID models, we estimated the impact of the dependent coverage provision on

changes in admission rates at publicly funded specialty SUD treatment centers with Equation (1):

(1) $Y_{ist} = \alpha + \gamma\, Treat_i + \delta\, Post_t + \eta(Treat_i * Post_t) + \beta UE_{st} + \Omega_s + \tau_t + Z_{st} + \varepsilon_{ist}$

where Y_{ist} represents each outcome of interest (rate of admissions, health insurance

coverage type, or expected source of payment) for age range i, where i=21-24 year olds or 30-34

year olds, in state s during year t. The variable $Post_t$ represents a dummy variable that has a

value of 1 for the years after the implementation of the law (2011-2012) and 0 otherwise (2007-

2009). The variable $Treat_i$ is a binary variable for membership in the 21-24 age range (relative to

the 30-34 range). The interaction of $Post_t$ and $Treat_i$ captures the average impact after the

provision by comparing outcomes before and after the law for the treatment group relative to the

control group.

The dependent coverage provision was implemented against the backdrop of the 2007-

2009 recession. This recession did not have a uniform labor market effect on young adults

(Bureau of Labor Statistics 2014). Moreover, access to private health insurance is tightly linked

to employment over our study period and the use of treatment facilities may be moderated by the

employment status of users. We included the unemployment rate specific to the age group in the

state where the individual receives treatment (UE_{st}) to capture potential differential impact of

prevailing macroeconomic conditions on our treatment and control groups. We included a vector

of state fixed effects (Ω_s) to account for time-invariant state characteristics, and an annual linear

time trend in τ_t, to control for seasonality and time. We also included state-specific linear time trends (Z_{st}) to control for time varying changes across states.

For our analysis of the impact of the law on changes in the number of admissions, we follow previous studies by aggregating our data to the state-year-treatment level (Barbaresco, Courtemanche, and Qi 2014). We use individual level data for our analysis of the law on health insurance coverage and payer source. We clustered standard errors at the year-treatment level.

V. Results

V.A. Descriptive Results

Table 2 illustrates that the majority (57.2 percent) of adults age 21-24 admitted to treatment in the period before the provision (2007-2009) were uninsured. Other forms of reported insurance included Medicaid (23.0 percent), private insurance (10.8 percent), and some other kind of insurance (8.9 percent). The source of payment differed slightly from insurance type in that Medicaid and private insurance paid for only 16.8 percent and 6.2 percent of all admissions, respectively. Self-pay was listed as the payment source for 16.6 percent of all admissions, and the remaining 60.4 percent was paid for by state and local funding sources. Proportions were very similar for the comparison sample of adults age 30-34.

Most admissions of young adults receiving SUD treatment were male (52.2 percent) and predominantly non-Hispanic white (76.8 percent) followed by African American (10.4 percent), Hispanic (8.5 percent) and other race (4.4 percent). Treatment primarily for alcohol accounted for 23.2 percent of all admissions and illicit drugs account for the remaining 76.8 percent. More than half of all admissions (51.6 percent) were to non-intensive outpatient settings. Intensive

outpatient was the setting for 16.5 percent of all admissions and the remaining 31.8 percent of all admissions were to residential settings. Again, proportions were similar for adults age 30-34.

Table 3 provides information on the number of admissions meeting our study criteria (i.e. non-detox, non-criminally referred admissions) per 1,000 individuals for all ages and by treatment and control group. Overall, there were 6.5 admissions per 1000 for young adults age 21-24. The equivalent number for those who were 30-34 years old was 6.1. Admissions were higher for men compared to women for both treatment and control groups. Average admissions were highest for African Americans compared to young adults of other racial and ethnic backgrounds. In addition, admissions for illicit drugs were higher than for alcohol for all ages and by treatment and control groups. Finally, Table 3 shows a higher rate of admission for treatment in a non-intensive setting compared to treatment in an intensive or residential setting.

V.B. Trends in Rate of Admissions, Coverage Source, and Payment Type

We present visual evidence of trends in rate of admissions, insurance status, and payment source for the treatment and control groups in Figures 1-5. The data points are unadjusted mean admissions per 1,000, proportions of admissions with an insurance type, or proportion of admissions with a payment source. In all the figures, the vertical line represents the year 2010 when the law was passed and implemented.

All graphs show a similar trend for the treatment and control groups prior to the passage of the law. After the law, overall admissions declined slightly for young adults and increased for the older adults (Figure 1). These overall changes are driven by noticeable declines for treated young adults males (right panel) and increases for older adult females (bottom panel). Figure 2 shows trends by race. The top left panel of Figure 2 shows that the trends in admissions for white young adults remain flat throughout the sample period. Graphs for African American and

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Hispanic young adults show noticeable changes in trends before and after the law. Specifically, admissions were flat or declining for all years except 2008. After the provision, African American young adult admissions for the treatment group remained flat while admissions for the control groups increased. For Hispanic young adults, admissions declined starting in 2009 for treated young adults. Our plots of admissions by treatment setting (Figure 3) show parallel trends before the law for intensive, non-intensive and residential treatment facilities with small changes after the provision.

Figure 4 illustrate that after 2010, the share of admissions with private insurance surged among adults age 21-24 from 11.5 in 2010 to 21.0 percent in 2012, while declining 8.5 to 8.2 percent in the comparison group. A similar pattern, starting from a lower base is observed for trends in private insurance as a source of payment (Figure 5). The share of admissions with Medicaid coverage flattened for adults age 21-24 after 2010 but increased for adults age 30-34 (Figure 4). The share of admissions with Medicaid as source of payment declined for both groups after 2010 (Figure 5). Before 2010, the share of admissions without insurance was similar for the treatment and control group, but after 2010, the uninsured share of adults 21-24 declined substantially while dipping only slightly for adults 30-34 (Figure 4). Self-payment as a source of payment decreased for both groups in 2011 and increased in 2012 (Figure 5), whereas payment by state/local government decreased consistently after 2010 for adults 21-24 while remaining flat for those age 30-34 (Figure 5).

Overall, our visual evidence suggests that for most outcome variables, the two groups trended similarly prior to the provision with changes in the trajectory of trends for the treatment group after 2010.

V.C. Number of Admissions Differences-in-Differences Estimates

Table 4 provides the coefficients for DID models estimating changes in the number of admissions to treatment per 1,000 adults age 21-24 relative to those per 1,000 adults age 30-34 after 2010. The estimated coefficient for the change for all young adults age 21-24 relative to adults age 30-34 is negative (-0.74 per 1,000); this is statistically significant at the 5 percent level. Compared to a pre-ACA treatment group mean of 6.66 per 1,000, this represents an 11 percent decrease in admissions. Young adult males and females both decreased the number of treatment episodes. Our exploration of heterogeneity in the effect of the provision by race/ethnicity, substance of use, and setting of treatment is presented in panel (b) of Table 4. Consistent with our main findings, we find that compared to our control group, the law is associated with a decrease of 0.76 admissions per 1,000 for white young adults in the treatment group. This represents an 11 percent decrease relative to baseline visits. We estimate a positive coefficient (0.06) for African American young adults in the treatment group relative to older African Americans. This coefficient is, however, not statistically significant at conventional levels. We find suggestive evidence of an 11 percent decrease in visits for Hispanic young adults following the implementation of the provision. The reduction in admissions relative to adults age 30-34 was statistically significant compared to a null hypothesis of no reductions for the two substances we consider: alcohol and illicit drugs. Admissions for young adults whose primary substances was alcohol decreased -0.32 per 1,000 and admissions for illicit drugs decreased by -0.42 per 1,000. Expressed as a percent, these are 17 and 9 percent decreases, respectively. While we find no evidence of changes in admissions to residential sites and facilities that provide intensive outpatient treatment, admissions at facilities that provide non-intensive treatment admissions decreased by 0.68 per 1,000, or 27 percent.

V.D. Insurance Coverage Type Differences-in-Differences Estimates

Table 5 provides DID estimates for changes in the type of health insurance reported for individuals age 21-24 admitted to treatment after the dependent coverage provision relative to counterparts age 30-34. After the provision, the proportion of adults age 21-24 in treatment with private insurance increased by 9.3 percentage points relative to the group age 30-34. This represents an increase of 85.8 percent relative to the baseline coverage rate of 10.9 percent in this group. Admissions with private coverage increased among every subgroup of adults 21-24 relative to counterparts age 30-34, but the magnitude of the effects varied substantially. In percentage points, the increases in private admissions among adults age 21-24 relative to adults 30-34 were largest for males, whites, individuals admitted primarily for illicit drug (rather than alcohol) treatment, and individuals admitted to intensive outpatient and residential treatment.

Compared to the respective baseline rates in these groups, the relative increases in private coverage were similar for men and women. By race/ethnicity, relative increases were largest for African Americans (94.3 percent increase) and smallest for Hispanics (close to 60 percent). The relative increases were also very large for admissions for illicit drugs and admissions to residential treatment (both increasing by more than 100 percent).

Table 5 also provides concurrent changes for other types of coverage: Medicaid, no insurance, and some other insurance type (such as Medicare or military). The largest decline among adults age 21-24 relative to adults 30-34 were admissions among individuals without insurance, which decreased overall by 5.3 percentage points. This was followed by admissions among individuals covered by Medicaid (which decreased 3.7 points) and admissions among individuals with some other insurance type (decreasing 0.3 points).

Relative to the 23.0 percent of admissions among adults 21-24 paid for by Medicaid before the 2010 provision, the Medicaid change represents a decline of 16.2 percent among

adults 21-24. Similarly, relative to the 57.2 percent of adults 21-24 admitted to treatment without insurance, the uninsured share decreased by 9.3 percent. The decline in the share without insurance was particularly large for men, whites, and individuals admitted to residential treatment.

V.E. Payer Source Differences-in-Differences

Table 6 examines changes in source of payment, independent of insurance coverage type at admission (as noted earlier, a treatment episode for an individual with insurance may be paid for outside of insurance). As Table 6 shows, after the provision, the number of all adults age 21-24 that had private insurance pay for their treatment admission increased by 6.5 percentage points relative to adults age 31-34. This represents an increase of 103.0 percent in the share of admissions among adults age 21-24 with private insurance as the payment source relative to the baseline mean of 6.3 percent. The percentage point changes in private insurance as a source of payment for adults 21-24 relative to those 30-34 was largest for males, whites, and those treated in intensive outpatient settings.

Compared to the baseline rates in these groups, the relative increases in payment by private insurance were largest for men, whites, individuals admitted to treatment primarily for illicit drugs, and those in the intensive outpatient setting.

Concurrent with the increase in private insurance payment, payment by states and localities decreased 2.8 percentage points and self or family payment decreased 2.7 percentage points among adults 21-24 relative to adults 30-34 after the provision. Compared to the baseline rates, these are reductions of 4.3 percent and 15.2 percent, respectively. Payment by Medicaid also decreased 1.1 percentage points among adults 21-24 relative to those 30-34, or 7.5 percent relative to the baseline Medicaid payment rate.

Compared to the baseline, changes in self-payment were largest for males, Hispanics, individuals admitted to alcohol treatment, and those in treatment at residential treatment facilities. By subgroups, the relative decline in payment by state and local government was largest for residential treatment (declining 8.5 percent) and the relative decline in Medicaid payment was largest for whites and Hispanics (declining 12.5 and 16.6 percent, respectively).

VI. Validity of Study Design and Robustness Checks

VI.A. Pre-Treatment Trends and Placebo Tests

Two key assumptions in our DID analysis are 1) that the treatment and control groups followed a similar trajectory before the law and, 2) that the composition of treatment and control groups was stable during our sample period.

Since our visual evidence is merely suggestive, we formalize our test of pre-trends by estimating regressions similar to our main estimation equation. The only difference is that instead of the usual DID variables, the key variable of interest is an interaction of the linear time trend and the treatment group dummy and the data is limited to the period before the law was passed (i.e., 2007 to 2009). In Table 7, the results of this estimation support our null hypothesis that the two groups followed a parallel trend before the passage of the law for admissions. The only coefficient that is statistically significant is that for Hispanic young adults (and this coefficient is only marginally statistically significant from zero at the 10 percent level). Similarly, we perform trends analysis for the insurance coverage and payer source outcomes. Out of 96 estimates, only two were statistically significant at the 5 percent level, which is consistent with there being no significant relationship.

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We also perform analysis with placebo laws to test the validity of our estimates. Using three years of data (2007 to 2009) prior to the passage of the law we defined two different placebo laws. The first (placebo law 1) assumes that the law was passed in 2008; with 2007 defined as the period before the law, and 2008 to 2009 defined as the period after the law. The second (placebo law 2) defines 2007 to 2008 as the period before the law and 2009 as the period after the law. The results of this exercise for admissions are presented in Tables 8-9.

We find three statistically significant and two marginally coefficients with our first placebo law for admissions (Table 8). For the total of 96 tests conducted for payer source and insurance coverage, only 4 were statistically significant at the 5 percent level, which is again consistent with there being no significant relationship. For the second placebo law (Table 9), four coefficients for admissions are significant, but the magnitudes of those coefficients are much smaller than our main results. Again, 4 of the 96 tests were statistically significant.

VI.B. Robustness Checks

We conducted several analyses to probe the sensitivity of our results. We estimated models where we include the year 2010 in our analysis as a post-treatment year (rather than excluding it as we did in our core analysis). These estimates were qualitatively similar to our preferred estimates (Table 10). The coefficients for the coverage type and payer source estimates were smaller for these analyses, which is consistent with the fact that implementation of the provision only took place in September 2010.

Our sample for the study is limited to a restricted set of states (25 for insurance analyses and 18 for payer source). Table 11 illustrates, using data on demographic characteristics drawn from the Annual Social and Economic Supplement to the Current Population Survey, that those states are broadly similar to the national averages. We replicated our admissions analyses on a

sample with all 50 states and the District of Columbia (1,013,838 observations). As before, we also estimated our regression equation with and without 2010 data. Our comprehensive sample shows a statistically significant decrease in visits of 1.43 per 1,000 without 2010 data and a decrease of 1.26 per 1,000 with 2010 data. This is in contrast with a decrease of 0.25 per 1,000 that is not statistically significant at conventional levels for our main results.

VII. Discussion and Conclusion

We examined changes in use of public sector specialty SUD treatment among adults age 21-24 before and after the implementation of the 2010 ACA provision that required most private insurers to offer dependent coverage to the adult children of their enrollees. Six key findings emerge from our analysis. First, the overall number of admissions to treatment decreased among adults age 21-24 after the provision, relative to counterparts age 30-34. This reduction was mainly attributable to a sharp decline in admissions to non-intensive outpatient treatment. Second, relative to adults 30-34, the share of adults age 21-24 covered by private insurance increased by 9.3 percentage points (increasing 86 percent over the baseline). Third, there was an increase of 6.5 percentage points in the share of adults age 21-24 (increasing 103.0 percent over the baseline) where the payment was private insurance (measured distinct from changes in private coverage in our TEDS data). Fourth, the rise in private coverage was mainly offset by admissions with Medicaid and uninsured admissions. Fifth, the rise in private payment was mainly offset by reductions in self-payment and state and local funding, and to a lesser extent by Medicaid. Sixth, in absolute terms the greatest increase in both private coverage and private payment were among subgroups of adults age 21-24 who were white, male, and those admitted to residential or intensive outpatient facilities.

The significant decrease in admissions among young adults is a novel finding that runs

counter to a hypothesis that increased coverage will increase use of public sector treatment and

to some prior literature on SUD treatment expansions (Dave and Mukerjee 2011; Wen et al.

2013). One possibility is that after 2010, young adults seeking SUD care disproportionately

substituted to facilities that exclusively serve privately insured clients, to office-based

physicians, or to non-SUD hospitals. While it has been estimated that the large majority of SUD

treatment admissions are to public sector providers, the role of other providers has been growing

(Mark et al. 2014). A recent study by Golberstein and colleagues (2014) showed that inpatient

admissions to hospitals with a SUD diagnosis increased among young adults after 2010, which

could provide suggestive evidence about one setting where young adults may be increasing their

treatment. The other study that has examined changes in SUD treatment (Saloner and Cook

2014) finds no change in treatment overall, but changes in admissions are estimated imprecisely.

Moreover, the study does not disaggregate public sector from other treatment settings.

The dramatic changes in health insurance coverage and payment source among young

adults after the provision suggests that expanded private coverage under the ACA may transform

the financing of SUD treatment. This effect has been anticipated by other scholars (Buck 2011;

Guerrero, Aarons, and Palinkas 2014; Mechanic 2012). The changes in coverage type for young

adults in public-sector SUD treatment are especially notable because this population had very

low rates of private insurance coverage prior to the 2010 law, probably due to the lower average

socioeconomic status of individuals receiving care from these providers.

These health insurance effects were particularly pronounced for subgroups. For example,

we found smaller effect sizes for Hispanics than other racial/ethnic groups. Although it is beyond

the scope of our study to fully address equity questions pertaining to the 2010 provision, the

heterogeneous effects by race/ethnicity suggest that the dependent coverage provision could have exacerbated some underlying disparities in SUD treatment across groups. Further research could more rigorously address this question.

We also find that the private coverage increase, and increase in private payment, was more skewed toward individuals in residential and intensive outpatient. This potentially reflects treatment upgrading. Placements in residential treatment are restricted in many public systems and are also difficult to obtain with Medicaid because of the so-called "institutions of mental disease" (IMD) exclusion which disqualifies medium and large residential facilities from collecting Medicaid reimbursement (Levit et al. 2013).

Our study underscores the importance of examining expected source of payment separately from insurance status for studies of SUD treatment. We find that the 6.5 percentage point increase in payment by private insurers is smaller than the increase in the share of admissions with private insurance coverage of 9.3 points in absolute terms, but is larger relative to the pre-ACA baseline. The baseline differences may reflect either individuals carrying private insurance plans that do not provide sufficient coverage of SUD treatment (which has historically been limited in many insurance plans) or it could reflect a lack of billing capacity from providers. As mentioned earlier, there is recent evidence suggesting that many providers still do not get reimbursed for treatment using encounters-based billing systems required by private insurers (Buck 2011). Our study suggests that the gap between private insurance coverage and private insurance payment for young adults may have narrowed by 2012, but was not eliminated.

Pressure to increase capture of private payment is likely to increase. Public payers, especially Medicaid programs and state and local agencies, have the opportunity to offset the spending burden of SUD treatment a major contributor to state budgets (Mark et al. 2014). In

our study, the largest reduction in payer source among adults age 21-24 was from reduced payment by states and localities and reduced out-of-pocket payment and uncompensated care. Pressure for insurers to pay for treatment is also likely to grow with the full implementation of the federal mental health and SUD parity law, which began taking effect in 2010. Federal parity will place greater scrutiny on insurers to offer SUD treatment in a manner consistent with physical health, although it is not immediately clear how this provision may affect access to public sector specialty treatment, a type of service with no direct analogue to physical health care.

Finally, the experience with the young adult provision may provide an indication of changes that could occur under early implementation of the ACA. The number of uninsured adults fell by an estimated 8 million between September 2013 and June 2014, and additional new enrollments occurred during the 2015 open enrollment period (Long et al. 2014). Medicaid expansions and other ACA reforms could provide more financing options for public sector providers, and could also disrupt the market for services by increasing competitive pressures on providers. Increases in insurance coverage under the ACA could lead to an expansion of the number of settings where individuals receive care and the modalities of treatment, potentially leading to greater choice for consumers.

VII.A. Conclusions

Policies that reduce the prevalence of SUDs in young adulthood have the potential to dramatically improve the health and wellbeing of young adults, reduce social expenditures (e.g., public assistance, emergency health care, criminal justice), and improve later life human capital and social outcomes. Such changes could arise through improved access to care as well as through improved quality and continuity of treatment for those already in the treatment system.

Our study finds a surprising decline in number of admissions to public sector treatment, but it remains an open question for research whether some individuals shifted their treatment to other settings and, if so, whether this treatment was of a higher quality. We also find that the provision reduced financial burden for those young adults in treatment and increased private insurance revenue for the public sector, especially in residential and intensive outpatient settings that have been historically difficult for uninsured people to access. Whether the savings from reduced state and local spending on treatment for the newly insured are reinvested back into prevention and awareness efforts, or into efforts to provide more supportive services for people in treatment, could determine whether the hoped for benefits of expanded access to substance abuse treatment are realized on a sustained, population-wide level.

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Table 1. Sample exclusion for the Treatment Episode Data Set 2007-2012

Sample Restriction	Sample	Treatment(21-24)	Control(30-34)
2007 to 2012 data only	11,402,766	1,386,564	1,384,071
Ages 21 to 24 and 30-34 only	2,770,635	1,386,564	1,384,071
Ages 21 to 24 and 30-34 and No criminal justice referral(CJ)	1,667,317	780,379	886,938
Ages 21 to 24 and 30-34,No CJ and No detox	1,221,610	580,087	641,523
Ages 21 to 24 and 30-34,No CJ, No detox and No Puerto Rico(PR)	1,220,136	579,638	640,498
Ages 21 to 24 and 30-34,No CJ, No detox, No PR and No 2010	1,013,838	480,502	533,336
Ages 21 to 24 and 30-34,No CJ, No detox, No PR and No 2010+ states with ins. Info	377,739	182,511	195,228
Ages 21 to 24 and 30-34,No CJ, No detox, No PR and No 2010+ states with pay. Info	230,358	110,857	119,501

Notes: States with insurance information included are AR, CO, DE, HI, IL, KS, KY, LA, ME, MD, MA, MO, MT, NE, NV, NH, NJ, ND, OR, PA, SC, SD, TX, UT, WY. States with payment source information included are These states are AR, CO, DE, HI, KS, KY, LA, MO, MT, NV, NH, NJ, ND, PA, SC, SD, TX, UT.

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Table 2. Share of Admissions by Age Category in 2007-2009

	Age 21-24	Age 30-34
Insurance Type		
Private	0.109	0.099
Medicaid	0.230	0.245
Uninsured	0.572	0.564
Other Insurance	0.089	0.091
Payer Source		
Private Insurance	0.062	0.058
Medicaid	0.168	0.185
Self/Family	0.166	0.167
Other Payer Source	0.604	0.590
Demographics		
Male	0.523	0.542
Female	0.477	0.458
White	0.768	0.694
African American	0.104	0.160
Hispanic	0.085	0.103
Other Race	0.043	0.043
Primary Substance Treated		
Alcohol Admission	0.232	0.308
Illicit Drug Admission	0.768	0.692
Treatment Setting		
Residential	0.319	0.301
Intensive outpatient	0.165	0.177
Nonintensive outpatient	0.516	0.521

Notes: Authors' analysis of Treatment Episode Data Set, 2007-2009. Intensive outpatient is any outpatient treatment lasting two or more hours that is administered at least three times per week. Nonintensive is any outpatient treatment with lower intensity.

Table 3. Summary Statistics of Admission Rates (Admissions per 1,000) in 2007-2009

	All Ages		Treatment(21-24)		Control(30-34)	
	Mean	**Std Dev**	**Mean**	**Std Dev**	**Mean**	**Std Dev**
All	6.344	3.971	6.539	4.356	6.149	3.551
Sex						
Male	6.691	4.348	6.725	4.567	6.657	4.136
Female	5.996	3.817	6.346	4.376	5.647	3.139
Race/Ethnicity						
White	6.579	4.484	6.925	5.051	6.233	3.825
African American	7.419	8.626	5.691	4.304	9.146	11.175
Hispanic	4.904	5.707	4.944	5.138	4.865	6.246
Primary Substance Treated						
Alcohol	1.927	1.422	1.720	1.383	2.135	1.437
Illicit	4.404	3.360	4.806	3.769	4.003	2.854
Setting						
Intensive	1.229	1.100	1.249	1.189	1.208	1.009
Non-intensive	3.349	2.796	3.436	2.984	3.263	2.603
Residential	1.764	1.282	1.852	1.364	1.675	1.194

Notes: Authors' analysis of Treatment Episode Data Set, 2007-2009. Intensive outpatient is any outpatient treatment lasting two or more hours that is administered at least three times per week. Non-intensive is any outpatient treatment with lower intensity.

Table 4. Impact of ACA dependent coverage law on admissions

	DID estimate	Pre-ACA treatment group mean
All	-0.740***	6.695
	(0.166)	
Sex		
Males	-0.721**	6.978
	(0.255)	
Females	-0.751***	6.401
	(0.146)	
Race/Ethnicity		
White	-0.764***	6.949
	(0.210)	
African American	0.063	5.970
	(0.883)	
Hispanic	-0.581*	5.290
	(0.289)	
Substance		
Alcohol	-0.316**	1.891
	(0.112)	
Illicit drugs	-0.424***	4.785
	(0.099)	
Setting		
Intensive	-0.016	1.182
	(0.034)	
Non-intensive	-0.681***	3.649
	(0.103)	
Residential	-0.042	1.862
	(0.071)	

Notes: Authors' analysis of Treatment Episode Data Set, 2007-2012. Intensive outpatient is any outpatient treatment lasting two or more hours that is administered at least three times per week. Non-intensive is any outpatient treatment with lower intensity. * Significant at 10% level, ** significant at the 5% level , ***, significant at the 1% level. Regressions also include state time trends and covariates for unemployment rate specific to the age group. Standard errors, displayed in parenthesis, are clustered by state and year.

Table 5. Estimates for the Effect of the Dependent Coverage Provision on Insurance Type

	Private		Medicaid		Uninsured		Other Insurance	
	DID Estimate	Pre-ACA Mean	DID Estimate	Pre-ACA Mean	DID Estimate	Pre-ACA Mean	DID Estimate	Pre-ACA Mean
All	0.093*** (0.008)	0.109	-0.037*** (0.004)	0.23	-0.053*** (0.005)	0.572	-0.003* (0.001)	0.089
Sex								
Males	0.12*** (0.01)	0.137	-0.03*** (0.003)	0.138	-0.086*** (0.009)	0.646	-0.004 (0.002)	0.079
Females	0.065*** (0.007)	0.078	-0.043*** (0.006)	0.33	-0.02*** (0.003)	0.492	-0.002 (0.002)	0.1
Race/Ethnicity								
White	0.108*** (0.01)	0.122	-0.044*** (0.004)	0.226	-0.061*** (0.007)	0.557	-0.004** (0.001)	0.094
African American	0.045*** (0.005)	0.048	-0.009 (0.01)	0.284	-0.034*** (0.007)	0.612	-0.003 (0.001)	0.056
Hispanic	0.043*** (0.005)	0.067	-0.03*** (0.008)	0.194	-0.016*** (0.005)	0.679	0.004 (0.004)	0.06
Substance								
Alcohol	0.082*** (0.006)	0.154	-0.023*** (0.005)	0.15	-0.06*** (0.006)	0.604	0.002 (0.004)	0.092
Illicit drugs	0.096*** (0.009)	0.095	-0.044*** (0.004)	0.254	-0.048*** (0.005)	0.563	-0.004* (0.002)	0.088
Setting								
Residential	0.109*** (0.009)	0.1	-0.032*** (0.006)	0.202	-0.068*** (0.005)	0.6	-0.009*** (0.001)	0.098
Intensive	0.123*** (0.016)	0.134	-0.074*** (0.01)	0.24	-0.046*** (0.011)	0.567	-0.004 (0.002)	0.058
Non-intensive	0.062*** (0.006)	0.106	-0.024*** (0.003)	0.245	-0.04*** (0.005)	0.556	0.002 (0.002)	0.093

Notes: Authors' analysis of Treatment Episode Data Set, 2007-2012. Intensive outpatient is any outpatient treatment lasting two or more hours that is administered at least three times per week. Non-intensive is any outpatient treatment with lower intensity. * Significant at 10% level, ** significant at the 5% level , ***, significant at the 1% level. Regressions also include state time trends and covariates for unemployment rate specific to the age group. Standard errors, displayed in parenthesis, are clustered by state and year.

Table 6. Estimates for the Effect of the Dependent Coverage Provision on Payer Source

	Private		Medicaid		Self/Family Pay		State or Local Gov't	
	DID Estimate	Pre-ACA Mean	DID Estimate	Pre-ACA Mean	DID Estimate	Pre-ACA Mean	DID Estimate	Pre-ACA Mean
				Panel a: Main results				
All	0.065***	0.063	-0.011***	0.14	-0.027***	0.171	-0.028***	0.625
	(0.006)		(0.003)		(0.005)		(0.006)	
Sex								
Males	0.091***	0.078	-0.01**	0.082	-0.045***	0.207	-0.036***	0.633
	(0.009)		(0.004)		(0.008)		(0.006)	
Females	0.038***	0.047	-0.009***	0.204	-0.011***	0.133	-0.017**	0.616
	(0.005)		(0.003)		(0.004)		(0.008)	
Race/Ethnicity								
White	0.078***	0.075	-0.018***	0.14	-0.029***	0.185	-0.031***	0.6
	(0.009)		(0.004)		(0.005)		(0.007)	
African American	0.019***	0.021	0.005	0.188	-0.011***	0.153	-0.014**	0.638
	(0.001)		(0.006)		(0.004)		(0.007)	
Hispanic	0.02***	0.02	-0.013	0.076	-0.019**	0.108	0.011	0.795
	(0.003)		(0.009)		(0.008)		(0.014)	
Substance								
Alcohol	0.06***	0.086	-0.003*	0.107	-0.047***	0.244	-0.01	0.562
	(0.005)		(0.001)		(0.003)		(0.005)	
Illicit drugs	0.066***	0.056	-0.013***	0.151	-0.018***	0.148	-0.035***	0.646
	(0.007)		(0.005)		(0.005)		(0.007)	
Setting								
Residential	0.072***	0.071	0.005	0.125	-0.017***	0.094	-0.061***	0.709
	(0.007)		(0.008)		(0.005)		(0.007)	
Intensive	0.101***	0.083	-0.029***	0.142	-0.016***	0.131	-0.057***	0.644
	(0.015)		(0.003)		(0.005)		(0.016)	
Non-Intensive	0.027***	0.049	-0.01***	0.151	-0.02***	0.248	0.003	0.552
	(0.003)		(0.003)		(0.006)		(0.007)	

Notes: Authors' analysis of Treatment Episode Data Set, 2007-2012. Intensive outpatient is any outpatient treatment lasting two or more hours that is administered at least three times per week. Non-intensive is any outpatient treatment with lower intensity. * Significant at 10% level, ** significant at the 5% level , ***, significant at the 1% level. Regressions also include state time trends and covariates for unemployment rate specific to the age group. Standard errors, displayed in parenthesis, are clustered by state and year.

Table 7. Test for Pre-Treatment Trends

Outcome variables	Number of Admissions	Insurance Status Private	Medicaid	Uninsured	Other Insurance	Payment Source Private	Medicaid	Self-Pay	State or Local Gov't
All	-0.087 (0.229)	0.005 (0.004)	-0.004 (0.007)	-0.004 (0.006)	0.003 (0.002)	0.004 (0.004)	0 (0.006)	-0.001 (0.003)	-0.003 (0.008)
Sex									
Males	0.034 (0.259)	0.007 (0.005)	-0.002 (0.006)	-0.006 (0.005)	0.002 (0.003)	0.005 (0.005)	0.003 (0.005)	0.001 (0.006)	-0.009 (0.008)
Females	-0.216 (0.214)	0.002 (0.004)	-0.004 (0.009)	-0.003 (0.009)	0.005 (0.003)	0.003 (0.003)	-0.002 (0.008)	-0.003 (0.003)	0.002 (0.009)
Race/Ethnicity									
White	-0.169 (0.306)	0.007* (0.004)	-0.007 (0.006)	-0.003 (0.006)	0.003 (0.003)	0.004 (0.004)	-0.003 (0.006)	-0.001 (0.005)	0 (0.009)
African American	0.748 (0.394)	-0.002 (0.004)	0.014 (0.011)	-0.014 (0.011)	0.001 (0.005)	0 (0.003)	0.005 (0.006)	0.005 (0.005)	-0.01 (0.009)
Hispanic	0.461** (0.156)	-0.001 (0.004)	-0.001 (0.01)	-0.004 (0.011)	0.006 (0.004)	0.004 (0.004)	0.013* (0.007)	-0.009 (0.006)	-0.008 (0.008)
Substance									
Alcohol	-0.025 (0.08)	-0.002 (0.005)	-0.002 (0.006)	-0.001 (0.008)	0.006 (0.005)	0.002 (0.005)	-0.003 (0.007)	-0.006 (0.008)	0.007 (0.014)
Illicit drugs	-0.055 (0.156)	0.007 (0.005)	-0.003 (0.009)	-0.005 (0.006)	0.002 (0.003)	0.005 (0.005)	0.002 (0.008)	-0.001 (0.003)	-0.006 (0.007)
Setting									
Intensive	-0.042 (0.056)	0.012 (0.008)	-0.002 (0.012)	-0.008 (0.008)	-0.002 (0.003)	0.009 (0.01)	-0.004 (0.01)	0.002 (0.003)	-0.007 (0.01)
Non-intensive	-0.157 (0.095)	0.001 (0.004)	-0.002 (0.006)	-0.004 (0.006)	0.006** (0.003)	0.001 (0.01)	0.001 (0.01)	-0.005 (0.004)	0.004 (0.01)
Residential	0.111 (0.084)	0.006 (0.005)	-0.007 (0.006)	-0.001 (0.006)	0.001 (0.003)	0.004 (0.003)	0 (0.007)	0.006 (0.004)	-0.01 (0.009)

Notes: Authors' analysis of Treatment Episode Data Set, 2007-2009. * Significant at the 10 percent level, ** significant at the 5 percent level, *** significant at the 1 percent level. Regressions also include state time trends and covariates for unemployment rate specific to the age group. Standard errors, displayed in parenthesis, are clustered by state and year.

Table 8. Placebo Test 1

Outcome variables	Number of Admissions	Insurance Status				Payment Source			
		Private	Medicaid	Uninsured	Other Insurance	Private	Medicaid	Self-Pay	State or Local Gov't
All	-0.265	0.004	-0.004	-0.007	0.008**	0.005	-0.001	-0.001	-0.003
	(0.169)	(0.006)	(0.012)	(0.011)	(0.003)	(0.006)	(0.013)	(0.006)	(0.016)
Sex									
Males	-0.012	0.005	0	-0.013	0.008	0.005	0.005	0.002	-0.012
	(0.181)	(0.008)	(0.01)	(0.009)	(0.005)	(0.008)	(0.009)	(0.011)	(0.017)
Females	-0.534**	0.002	-0.005	-0.006	0.008*	0.006	-0.005	-0.007	0.006
	(0.178)	(0.006)	(0.015)	(0.015)	(0.005)	(0.008)	(0.011)	(0.007)	(0.017)
Race/Ethnicity									
White	-0.493*	0.007	-0.01	-0.004	0.007*	0.004	-0.003	-0.002	0.001
	(0.201)	(0.007)	(0.011)	(0.011)	(0.004)	(0.007)	(0.01)	(0.009)	(0.018)
African American	0.363	-0.005	0.02	-0.019	0.004	0.003	0	0.011	-0.014
	(1.003)	(0.007)	(0.018)	(0.017)	(0.008)	(0.006)	(0.023)	(0.008)	(0.022)
Hispanic	0.981**	0.003	0	-0.013	0.01*	0.009	0.014	-0.019	-0.004
	(0.266)	(0.007)	(0.018)	(0.02)	(0.006)	(0.006)	(0.011)	(0.013)	(0.015)
Substance									
Alcohol	-0.037	-0.008	0.001	-0.001	0.008	0.002	-0.008	-0.007	0.014
	(0.067)	(0.008)	(0.01)	(0.013)	(0.007)	(0.008)	(0.012)	(0.018)	(0.027)
Illicit drugs	-0.221*	0.007	-0.005	-0.01	0.008*	0.007	0.004	-0.003	-0.007
	(0.107)	(0.009)	(0.015)	(0.012)	(0.004)	(0.007)	(0.015)	(0.005)	(0.014)
Setting									
Intensive	-0.129***	0.014	0.009	-0.026*	0.002	0.01	-0.003	0.006	-0.013
	(0.025)	(0.012)	(0.02)	(0.015)	(0.004)	(0.014)	(0.019)	(0.006)	(0.016)
Non-intensive	-0.257*	-0.003	-0.005	-0.002	0.01**	0.004	-0.002	-0.012	0.01
	(0.114)	(0.006)	(0.01)	(0.011)	(0.005)	(0.006)	(0.012)	(0.007)	(0.018)
Residential	0.12	0.009	-0.009	-0.006	0.005	0.002	0	0.01	-0.011
	(0.077)	(0.008)	(0.016)	(0.016)	(0.005)	(0.006)	(0.013)	(0.008)	(0.019)

Notes: Authors' analysis of Treatment Episode Data Set, 2007-2009. * Significant at the 10 percent level, ** significant at the 5 percent level, *** significant at the 1 percent level. Regressions also include state time trends and covariates for unemployment rate specific to the age group. Standard errors, displayed in parenthesis, are clustered by state and year.

Table 9. Placebo Test 2

Outcome variables	Number of Admissions	Insurance Status				Payment Source			
		Private	Medicaid	Uninsured	Other Insurance	Private	Medicaid	Self-Pay	State or Local Gov't
All	-0.344	0.01	-0.006	-0.005	0.001	0.006	0.002	-0.002	-0.006
	(0.177)	(0.007)	(0.012)	(0.01)	(0.004)	(0.007)	(0.011)	(0.007)	(0.015)
Sex									
Males	-0.293	0.015*	-0.007	-0.006	-0.002	0.011	0.004	0	-0.014
	(0.164)	(0.009)	(0.011)	(0.009)	(0.006)	(0.01)	(0.009)	(0.011)	(0.015)
Females	-0.401	0.005	-0.007	-0.003	0.005	0.002	0	-0.003	0.002
	(0.282)	(0.007)	(0.016)	(0.015)	(0.005)	(0.015)	(0.009)	(0.011)	(0.015)
Race/Ethnicity									
White	-0.489	0.015**	-0.011	-0.004	0.001	0.007	-0.005	-0.002	0
	(0.253)	(0.007)	(0.01)	(0.01)	(0.004)	(0.007)	(0.009)	(0.009)	(0.016)
African American	1.536**	0	0.023	-0.022	-0.001	-0.002	0.014	0.003	-0.016
	(0.56)	(0.006)	(0.02)	(0.021)	(0.007)	(0.006)	(0.01)	(0.01)	(0.02)
Hispanic	0.315	-0.006	-0.004	0.001	0.009	0.004	0.025*	-0.009	-0.02
	(0.563)	(0.006)	(0.018)	(0.018)	(0.007)	(0.006)	(0.017)	(0.01)	(0.014)
Substance									
Alcohol	-0.163**	0.001	-0.008	-0.003	0.01	0.004	0	-0.01	0.006
	(0.057)	(0.009)	(0.011)	(0.014)	(0.007)	(0.01)	(0.012)	(0.018)	(0.028)
Illicit drugs	-0.179	0.013	-0.005	-0.006	-0.002	0.008	0.003	0.001	-0.012
	(0.144)	(0.01)	(0.015)	(0.01)	(0.005)	(0.009)	(0.013)	(0.006)	(0.013)
Setting									
Intensive	-0.079	0.022*	-0.014	0.001	-0.009*	0.016	-0.008	-0.001	-0.006
	(0.045)	(0.012)	(0.021)	(0.013)	(0.005)	(0.019)	(0.014)	(0.006)	(0.017)
Non-intensive	-0.346**	0.005	-0.002	-0.01	0.007	-0.002	0.003	-0.002	0.001
	(0.101)	(0.007)	(0.011)	(0.011)	(0.005)	(0.012)	(0.012)	(0.006)	(0.018)
Residential	0.078	0.009	-0.01	0.004	-0.002	0.009*	0.002	0.006	-0.017
	(0.074)	(0.009)	(0.017)	(0.013)	(0.006)	(0.005)	(0.013)	(0.008)	(0.017)

Notes: Authors' analysis of Treatment Episode Data Set, 2007-2009. * Significant at the 10 percent level, ** significant at the 5 percent level, *** significant at the 1 percent level. Regressions also include tate time trends and covariates for unemployment rate specific to the age group. Standard errors, displayed in parenthesis, are clustered by state and year.

Table 10. Sensitivity Using 2010 As a Pre-Treatment Year

Outcome variables	Number of Admissions	Insurance Status				Payment Source			
		Private	Medicaid	Uninsured	Other Insurance	Private	Medicaid	Self-Pay	State or Local Gov't
All	-0.595***	0.069***	-0.031***	-0.037**	-0.001	0.049***	-0.012***	-0.023***	-0.013
	(0.178)	(0.016)	(0.005)	(0.01)	(0.001)	(0.011)	(0.002)	(0.004)	(0.01)
Sex									
Males	-0.648**	0.091***	-0.025***	-0.064***	-0.002	0.068***	-0.009**	-0.038***	-0.021*
	(0.227)	(0.019)	(0.004)	(0.015)	(0.002)	(0.015)	(0.003)	(0.007)	(0.011)
Females	-0.532**	0.047***	-0.038***	-0.008	-0.001	0.028***	-0.014***	-0.011**	-0.003
	(0.191)	(0.012)	(0.005)	(0.007)	(0.002)	(0.007)	(0.003)	(0.005)	(0.009)
Race/Ethnicity									
White	-0.600**	0.082***	-0.036***	-0.044***	-0.002	0.059***	-0.019***	-0.025***	-0.015
	(0.218)	(0.018)	(0.006)	(0.011)	(0.001)	(0.014)	(0.003)	(0.005)	(0.011)
African American	0.743	0.029**	-0.01	-0.018	-0.001	0.012**	-0.003	-0.014*	0.004
	(0.806)	(0.011)	(0.008)	(0.011)	(0.002)	(0.005)	(0.006)	(0.004)	(0.011)
Hispanic	-0.25	0.03**	-0.029***	-0.005	0.004	0.014**	-0.009	-0.02**	0.015
	(0.356)	(0.008)	(0.006)	(0.008)	(0.003)	(0.005)	(0.007)	(0.006)	(0.011)
Substance									
Alcohol	-0.289**	0.06***	-0.018**	-0.046***	0.004	0.041**	-0.002	-0.039***	0.001
	(0.113)	(0.013)	(0.005)	(0.009)	(0.003)	(0.012)	(0.002)	(0.006)	(0.009)
Illicit drugs	-0.307**	0.072***	-0.037***	-0.032**	-0.003	0.051***	-0.015***	-0.016**	-0.02
	(0.115)	(0.017)	(0.006)	(0.011)	(0.002)	(0.011)	(0.003)	(0.004)	(0.01)
Setting									
Intensive	-0.018	0.094***	-0.065***	-0.028*	-0.002	0.08***	-0.031***	-0.012**	-0.038*
	(0.029)	(0.021)	(0.01)	(0.014)	(0.003)	(0.017)	(0.003)	(0.004)	(0.015)
Non-intensive	-0.542***	0.045***	-0.019***	-0.028**	0.002	0.021***	-0.011**	-0.02**	0.01
	(0.126)	(0.011)	(0.004)	(0.008)	(0.002)	(0.005)	(0.003)	(0.006)	(0.015)
Residential	-0.034	0.079***	-0.025***	-0.048**	-0.006**	0.05**	0.003	-0.015**	-0.038**
	(0.067)	(0.02)	(0.006)	(0.013)	(0.002)	(0.015)	(0.005)	(0.004)	(0.014)

Notes: Authors' analysis of Treatment Episode Data Set, 2007-2009. * Significant at the 10 percent level, ** significant at the 5 percent level, *** significant at the 1 percent level. Regressions also include state time trends and covariates for unemployment rate specific to the age group. Standard errors, displayed in parenthesis, are clustered by state and year.

Table 11. March CPS demographics

Sample:	Full TEDS sample		Insurance states*		Payer states**	
		Mean/		Mean/		Mean/
Variable	N	proportion	N	proportion	N	proportion
Age	294	37.384	149	37.297	107	37.103
Male	294	0.491	149	0.492	107	0.492
Female	294	0.509	149	0.508	107	0.508
White	294	0.808	149	0.809	107	0.795
African American	294	0.104	149	0.095	107	0.099
Other race	294	0.088	149	0.095	107	0.106
Hispanic	294	0.104	149	0.095	107	0.098
Married	294	0.418	149	0.421	107	0.420
Divorced	294	0.146	149	0.144	107	0.144
Never married	294	0.436	149	0.435	107	0.436
Less than high school	294	0.168	149	0.163	107	0.168
High school	294	0.298	149	0.299	107	0.303
Some college	294	0.276	149	0.279	107	0.278
College graduate	294	0.258	149	0.259	107	0.251
Health insurance	294	0.860	149	0.861	107	0.854
Family income	294	71621.41	149	72128.47	107	70442.86

Notes: Unit of observation is a state in a year. Data source is the Annual Social and Economic Supplement to the Current Population Survey.

*Insurance states include: AR, CO, DE, HI, IL, KS, KY, LA, ME, MD, MA, MO, MT, NE, NV, NH, NJ, ND, OR, PA, SC, SD, TX, UT, and WY.

**Payer states include: AR, CO, DE, HI, KS, KY, LA, MO, MT, NV, NH, NJ, ND, PA, SC, SD, TX, and UT.

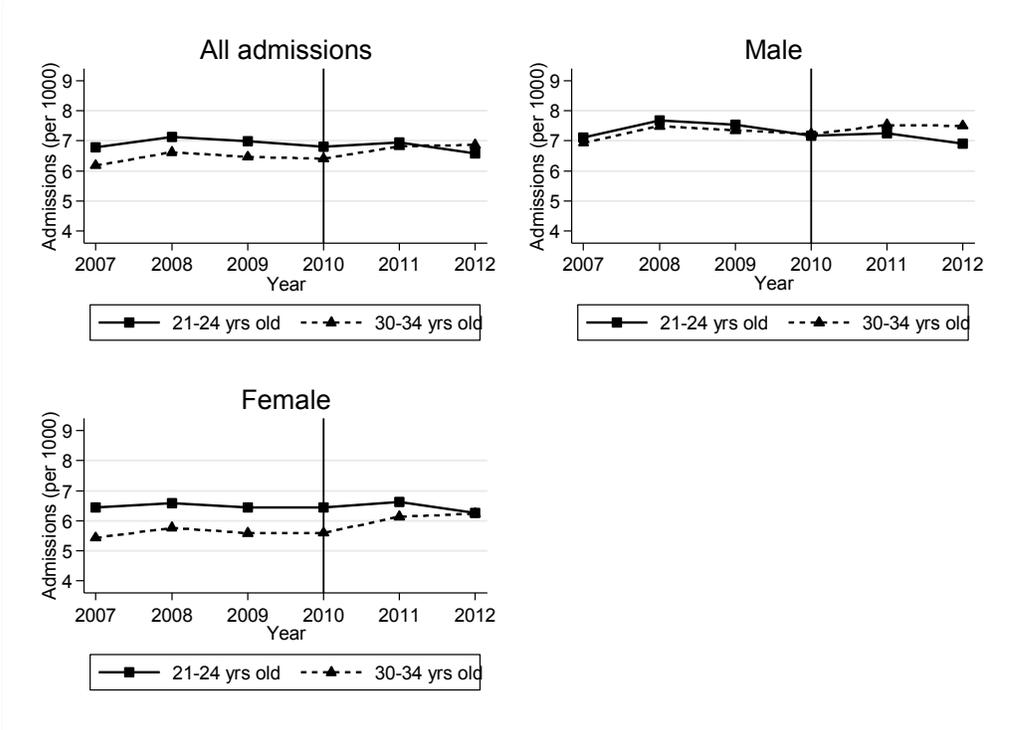**Figure 1. Trends in Admissions Overall and by Sex**

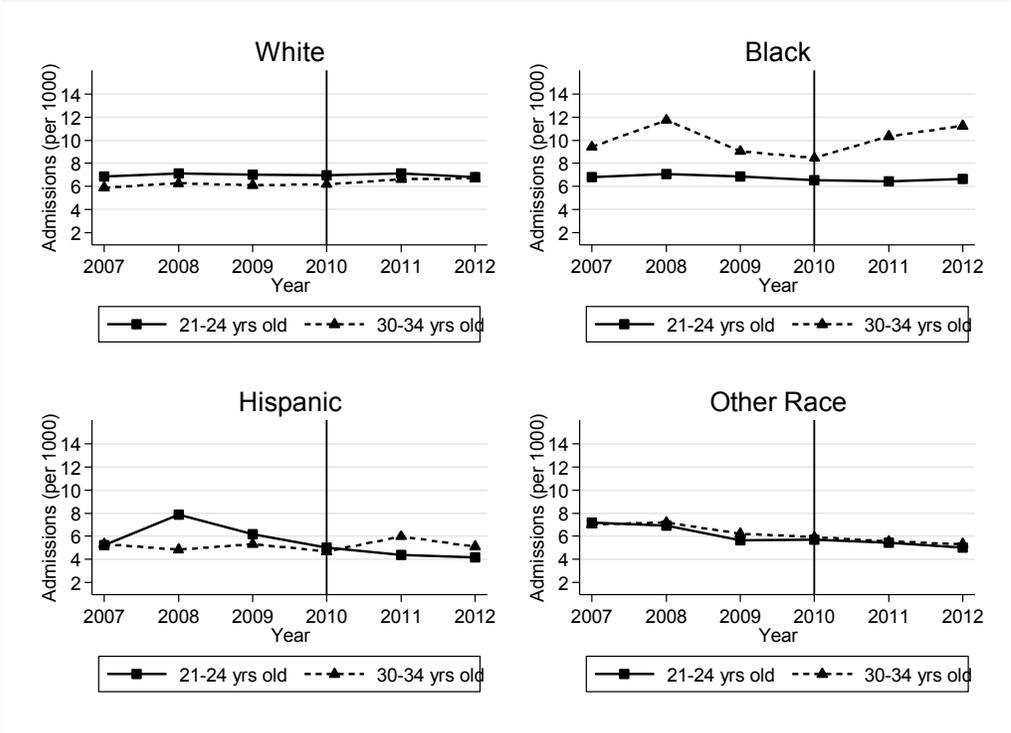**Figure 2. Trends in Admissions by Race/Ethnicity**

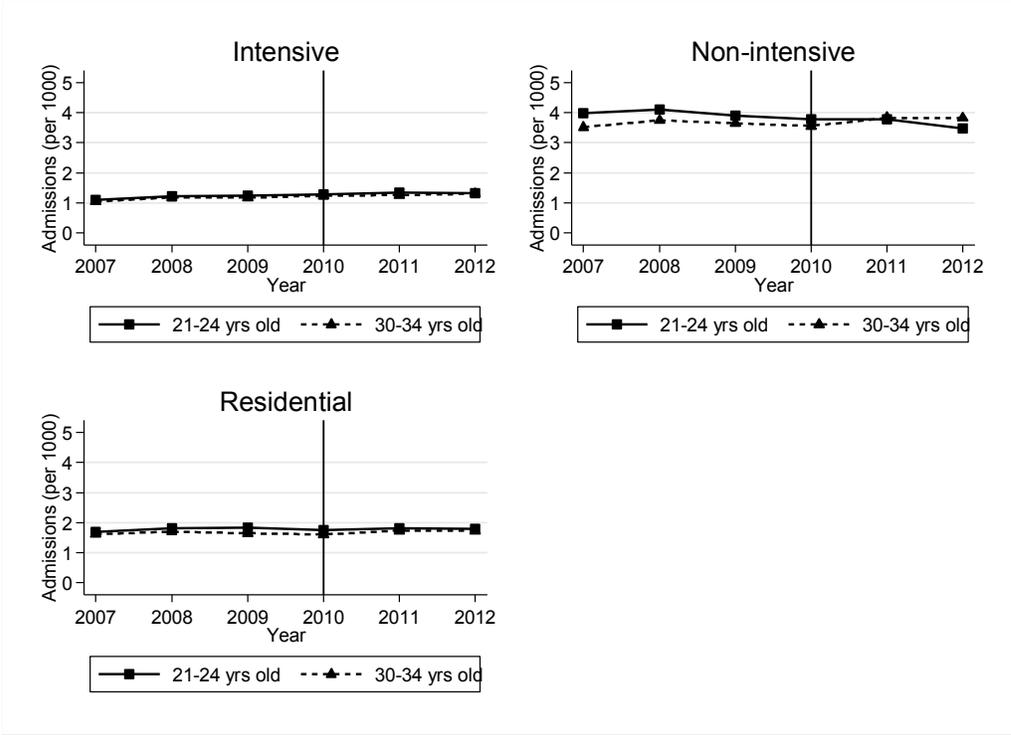**Figure 3. Trends in Admissions by Treatment Setting**

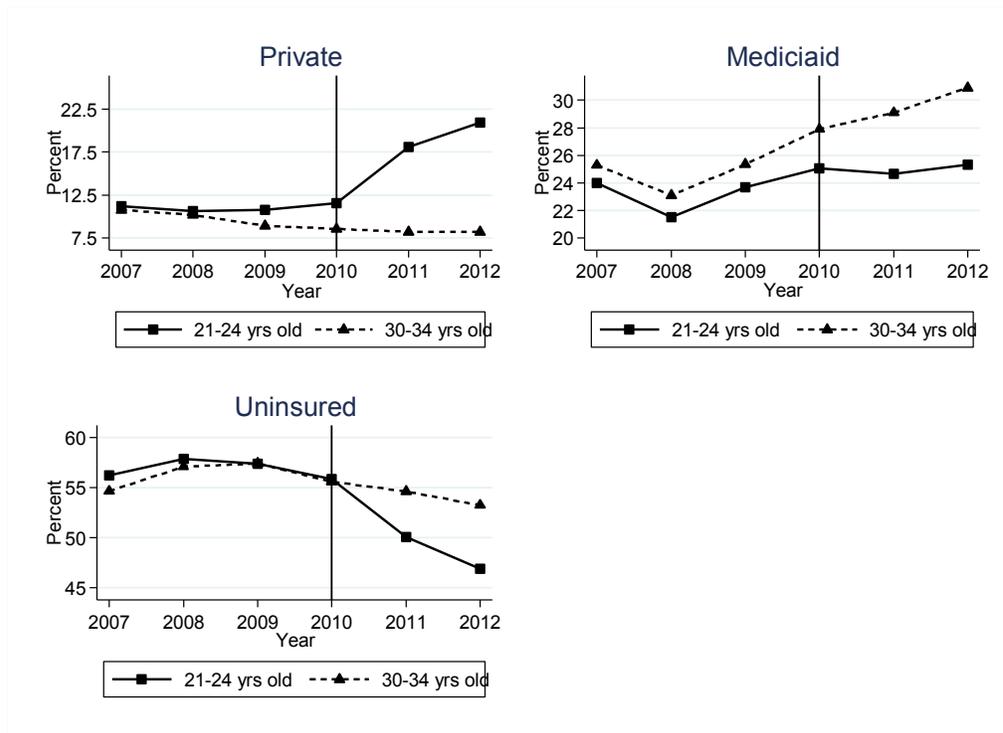**Figure 4. Trends in Insurance Status for SUD Admissions**

Figure 5. Trends in Payment Source for SUD Admission